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of
Transportation
Ontario

FREIGHT DISTRIBUTION SERIES

VOL. 1: 1987 TRUCK SURVEY

Goods Distribution Systems Office
Provincial Transportation Division

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FORWARD

In 1987, the Ministry of Transportation, Ontario undertook a truck transportation survey in order to provide input for the development of a truck costing model, and to gather specific information for several areas in the ministry.

While the survey data met the objectives in this regard, it was soon realized that the data could be of use in applications beyond those envisioned at the outset of the study. In particular, the survey served as the basis for analysis of empty truck movements on Ontario's main highways, and provided information for use in the office's **Economic Corridor Analysis Series**.

The following report summarizes the methodology and general findings of the 1987 Truck Survey, and is the first volume in the Ministry of Transportation, Ontario's **Freight Distribution Series**. For more information on this and other papers in the series, please contact Bill Raney, Senior Costing Advisor, or Karen Siwak, Logistics Analyst, at:

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A. INTRODUCTION

During the summer of 1987, the Ontario Ministry of Transportation conducted truck surveys at 12 vehicle inspection stations located throughout the province. The locations of the survey points are illustrated in Maps I & II. Table I outlines the times during which the survey took place.

TABLE I: SURVEY LOCATIONS

STATION	LOCATION	SURVEYS CONDUCTED FROM	TO
613	Highway 17, Red Rock, Westbound	June 25th, 12AM	June 26th, 11PM
	Highway 17, Red Rock, Eastbound	June 26th, 12AM	June 27th, 11PM
622	Highway 17, Vermillion Bay, Westbound	June 29th, 12PM	June 30th, 11PM
	Highway 17, Vermillion Bay, Eastbound	June 29th, 12PM	June 30th, 11PM
521	Highway 11, Cochrane, Northbound	July 2nd, 6AM	July 3rd, 5AM
	Highway 11, Cochrane, Southbound	July 2nd, 6AM	July 3rd, 5AM
311	Highway 401, Putnam, Westbound	July 14th, 6AM	July 15th, 5AM
311	Highway 401, Putnam, Eastbound	July 15th, 6AM	July 16th, 5AM
424	Highway 417, Casselman, Westbound	July 21st, 6AM	July 23rd, 5AM
235	Q.E.W., Winona, Southbound	August 5th, 12AM	August 6th, 7AM
232	Q.E.W., Fruitland, Northbound	August 6th, 8AM	August 7th, 1PM
411	Highway 401, Gananoque, Westbound	August 11th, 6AM	August 12th, 1PM
412	Highway 401, Gananoque, Eastbound	August 12th, 2PM	August 13th, 9PM
212	Highway 400, Woodbridge, Southbound	August 17th, 10AM	August 19st, 9AM
213	Highway 400, King, Northbound	August 19th, 10AM	August 21st, 9AM

The Goods Distribution Systems Office has already used the data for an in-depth analysis of empty movements, and for economic corridor studies. The purpose of this report is to provide a brief description of the survey methodology, and to present a compilation of survey results which may be useful to other areas.

B. SURVEY METHODOLOGY

i. Classification Study

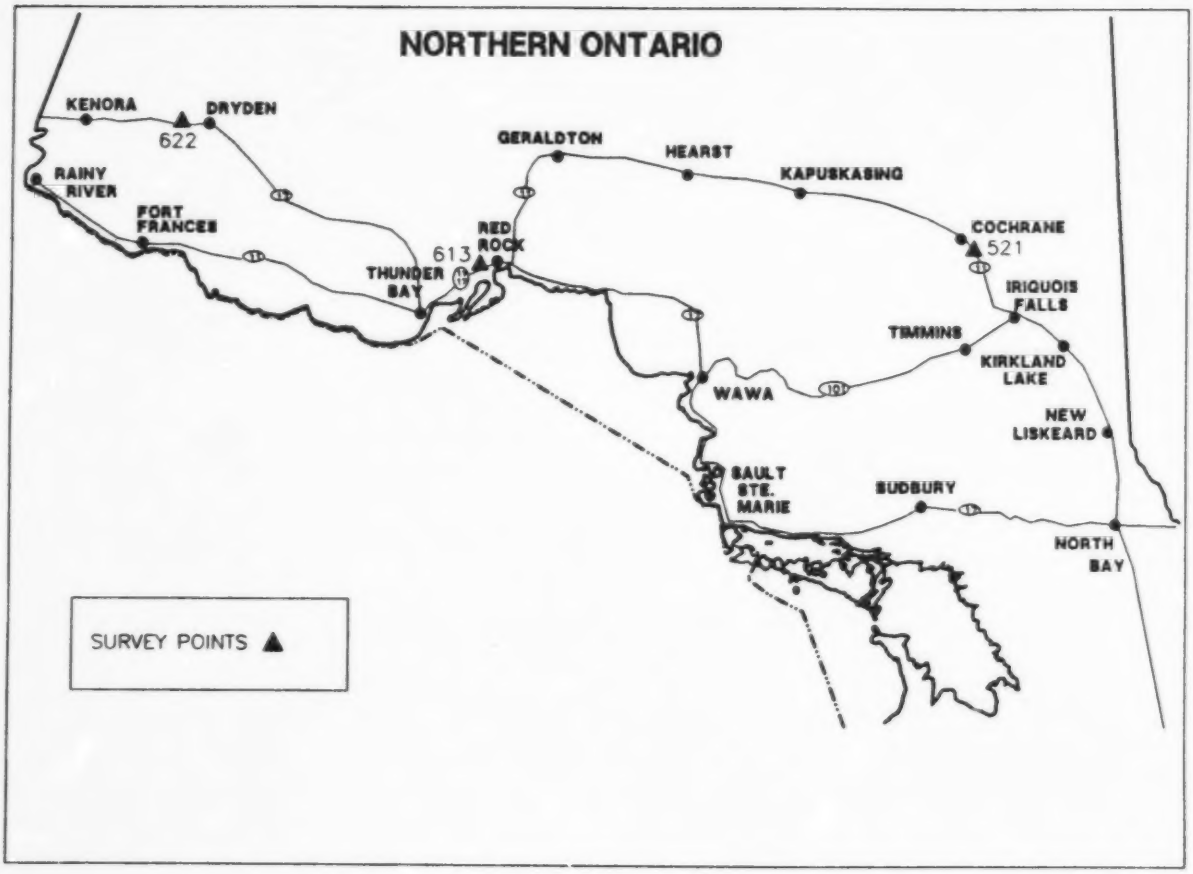
Data was collected on general traffic flows through a classification study, which determined the total number of vehicles passing the inspection stations during the survey period. A total vehicle count per hour was obtained for cars as well as for truck types such as straight trucks, tractor trailers and specialized equipment (see Appendix 1 for an example of the classification for used).

ii. Driver Questionnaire

At the same time, a questionnaire was administered by trained summer students to a random sample of tractor trailer and straight truck drivers. Data obtained through the questionnaire concerned employment type, origin, destination, weight of freight, number of shipments, commodity type, and cube utilized. Observations were recorded on equipment configuration, trailer style, the number of axles and the time of interview. The gross vehicle weight was recorded from the weighing platform (see Appendix 2 for a sample questionnaire).

Driver co-operation in the questionnaire was excellent, with more than 99% of the selected drivers participating. Table II outlines the interview rate at each of the inspection stations.

MAP I: NORTHERN ONTARIO SURVEY POINTS



MAP II: SOUTHERN ONTARIO SURVEY POINTS

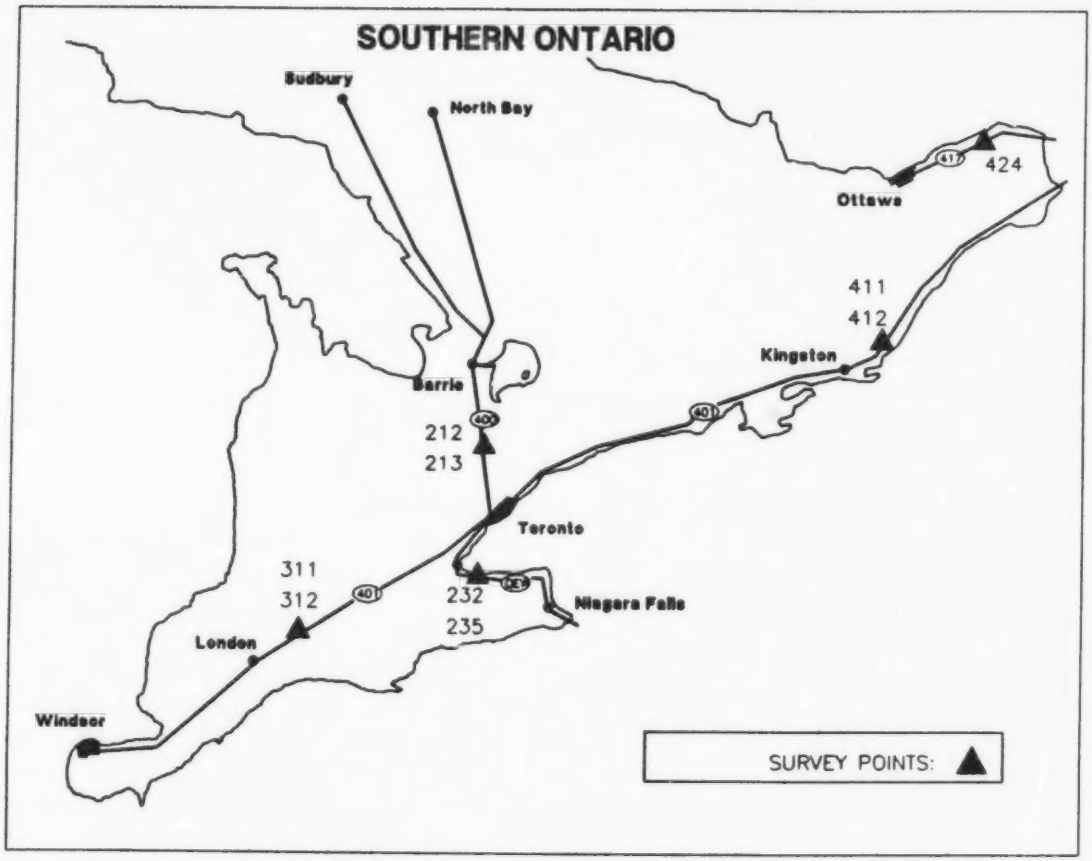


TABLE II: INTERVIEW RATE

STATION	LOCATION	ELIGIBLE TRUCKS PASSING STATION	DRIVERS INTERVIEWED	PERCENT INTERVIEWED
613	Highway 17, Red Rock, Westbound	732	423	57.8%
	Highway 17, Red Rock, Eastbound	646	348	53.9%
622	Highway 17, Vermillion Bay, Westbound	226	153	67.7%
	Highway 17, Vermillion Bay, Eastbound	292	190	65.1%
521	Highway 11, Cochrane, Northbound	232	112	48.3%
	Highway 11, Cochrane, Southbound	273	152	55.7%
311	Highway 401, Putnam, Westbound	3412	754	22.1%
312	Highway 401, Putnam, Eastbound	3760	1035	27.5%
424	Highway 417, Casselman, Westbound	1103	651	59.0%
235	Q.E.W., Winona, Southbound	3949	1185	30.0%
232	Q.E.W., Fruitland, Northbound	4509	1379	30.6%
411	Highway 401, Gananoque, Westbound	3212	1018	31.7%
412	Highway 401, Gananoque, Eastbound	3262	1241	38.0%
212	Highway 400, Woodbridge, Southbound	4678	1449	31.0%
213	Highway 400, King, Northbound	4259	1554	36.5%

iii. Data Compilation

Once the interviews were completed, each origin and destination was coded using M.T.O.'s Provincial Transportation Zone coding system in order to facilitate transportation corridor analysis. The information from the questionnaires was entered into a micro-computer database program.

A 10% random sample of questionnaires was then verified to ensure keypunch accuracy. In addition, a series of edit checks were performed to verify the accuracy of the data contained in the questionnaire. These checks included:

- verification that the recorded shipment weight was correct, by comparing the recorded shipment weight plus the estimated vehicle weight to the total weight obtained from the scale reading
- a comparison of the number of axles to the vehicle configuration
- a comparison of shipment weight, number of shipments, cube and freight type; all four factors had to be recorded as zero for a trip to be considered as an empty move
- verification that origins and destinations matched direction of travel, for example that southbound loads had southern destinations and northbound loads had northern destinations.

Corrections were made to questionnaires when obvious errors were discovered. If an error could not be corrected, the questionnaire was discarded. Approximately 3% of the questionnaires fell into this category.

C. SURVEY RESULTS

i. Vehicle Count

Tables III and IV outline the results of the classification portion of the survey conducted at each of the stations. Table III outlines the survey totals for each of the vehicle types counted during this portion of the study. Table IV gives an hourly breakdown of the vehicle totals in each of the corridors, and indicates the proportion of trucks which were eligible for the questionnaire portion of the survey.

TABLE III: VEHICLE COUNT

STATION	# OF HOURS	CARS	STRAIGHT TRUCKS	TRACTOR TRAILERS	TRACTOR ONLY	TANKERS	FLOATS	CEMENT TRUCKS	DUMP TRUCKS	AUTO CARRIERS	OTHER	TOTAL TRUCKS	TOTAL VEHICLES
613 W	48	4,203	94	638	14	72	40	10	4	9	100	981	5,184
613 E	48	4,021	94	552	18	72	37	10	5	11	99	898	4,919
622 W	24	2,031	41	185	7	19	6	3	15	4	27	307	2,338
622 E	24	2,229	67	225	5	21	17	5	15	9	17	381	2,610
521 N	24	1,863	65	167	5	15	15	5	18	6	15	311	2,174
521 S	24	1,944	63	210	6	12	14	4	10	2	14	335	2,279
311 W	24	12,300	620	2,792	72	283	85	8	30	115	36	4,041	16,341
312 E	24	11,274	816	2,944	62	286	95	9	62	138	65	4,477	15,751
424 W	48	10,323	322	781	12	109	18	6	12	11	99	1,370	11,693
235 S	32	29,522	1,020	2,929	67	444	69	55	104	83	151	4,922	34,444
232 N	30	39,902	1,192	3,317	98	440	61	57	136	81	140	5,522	45,424
411 W	32	9,633	293	2,919	40	231	34	17	36	41	65	3,676	13,309
412 E	32	10,201	313	2,949	16	217	30	17	34	66	54	3,696	13,897
212 S	48	62,400	1,570	3,108	109	382	74	56	273	44	570	6,186	68,586
213 N	48	49,137	1,294	2,965	94	382	65	61	156	34	222	5,273	54,410

TABLE IV: HOURLY TRAFFIC ANALYSIS

STATION	TOTAL VEHICLES PER HOUR	TOTAL TRUCKS PER HOUR	TRUCKS AS PERCENTAGE OF TOTAL VEHICLES	TOTAL TRUCKS ELIGIBLE FOR INTERVIEW	PERCENTAGE OF TRUCKS ELIGIBLE FOR INTERVIEW	ELIGIBLE TRUCKS AS PERCENTAGE OF TOTAL VEHICLES
613 W	108	20	18.9%	15	74.6%	14.1%
613 E	102	19	18.3%	13	71.9%	13.1%
622 W	97	13	13.1%	9	73.6%	9.7%
622 E	109	16	14.6%	12	76.6%	11.2%
521 N	91	13	14.3%	10	74.6%	10.7%
521 S	95	14	14.7%	11	81.5%	12.0%
311 W	681	168	24.7%	142	84.4%	20.9%
312 E	656	187	28.4%	157	84.0%	23.9%
424 W	244	29	11.7%	23	80.5%	9.4%
235 S	1,076	154	14.3%	123	80.2%	11.5%
232 N	1,514	184	12.2%	150	81.7%	9.9%
411 W	416	115	27.6%	100	87.4%	24.1%
412 E	434	116	26.6%	102	88.3%	23.5%
212 S	1,429	129	9.0%	97	75.6%	6.8%
213 N	1,134	110	9.7%	89	80.8%	7.8%

ii. Equipment Types

During the questionnaire portion of the survey, observations were recorded on equipment type, trailer style and number of axles. The following four tables are the cumulative results for all stations.

Table V outlines the occurrence of various equipment types, broken down by the number of axles on the entire unit. As the numbers indicate, the most common type of equipment observed during the questionnaire portion of the survey was a tractor with a van trailer, having 5 axles in total. Trucks exceeding 7 axles were relatively rare.

TABLE V: AXLES BY EQUIPMENT TYPE

AXLES	STRAIGHT TRUCK	TRACTOR TRAILER WITH: VAN	FLATBED	STAKE & RACK	CONTAINER	TOTAL
2	1,540	---	---	---	---	1,540
3	341	---	---	---	---	341
4	16	368	21	3	11	419
5	13	6,052	792	236	166	7,259
6	10	622	285	94	28	1,039
7	---	219	327	135	20	701
8	---	86	131	38	35	290
9	---	7	31	7	2	47
10	---	1	1	1	0	3
11	---	1	1	1	0	3
TOTAL	1,920	7,356	1,589	515	262	11,642

Table VI breaks down the trailer style by the equipment configuration, and applies only to tractor trailer units. The most common trailer style for single trailer, A-train and C-train units was a van, while B-train units most often had flatbed trailers.

TABLE VI: TRAILER BY CONFIGURATION ON TRACTOR TRAILERS

TRAILER STYLE	TRACTOR WITH ONE TRAILER	TRACTOR WITH TWO TRAILERS A-TRAIN	B-TRAIN	C-TRAIN	TOTAL
VAN	7,024	255	42	35	7,356
FLAT BED	1,346	68	162	13	1,589
STAKE & RACK	474	9	28	4	515
CONTAINER	211	36	8	8	262
TOTAL	9,055	368	239	60	9,722

Table VII breaks down the configuration of tractor trailers by the number of axles on the unit. Again, the data only applies to tractor trailer units.

TABLE VII: AXLES BY CONFIGURATION ON TRACTOR TRAILERS

NUMBER OF AXLES	TRACTOR WITH ONE TRAILER	TRACTOR WITH TWO TRAILERS A-TRAIN	B-TRAIN	C-TRAIN	TOTAL
4	403	---	---	---	403
5	7,205	34	4	3	7,246
6	859	128	24	18	1,029
7	439	103	132	27	701
8	130	81	69	10	290
9	16	21	8	2	47
10	2	1	0	0	3
11	1	0	2	0	3
TOTAL	9,055	368	239	60	9,722

Observations were also made on the style of tractor on each truck. As Table VIII indicates, cabover tractors were less common, and were used more frequently with two trailer units.

TABLE VIII: TRACTOR STYLE

	CONVENTIONAL	CABOVER
TRACTOR WITH ONE TRAILER	76.5%	23.5%
TRACTOR WITH TWO TRAILERS	72.9%	27.1%
STRAIGHT TRUCK	83.0%	17.0%
AVERAGE	77.3%	22.7%

iii. Differences Between Corridors

Total survey figures, such as are given in the previous tables, must be used with caution. Due to differences in interview times and traffic volumes, such sums will be more reflective of the stations with a high number of interviews, especially the southern Ontario stations. There were significant variations in the types of equipment in each of the corridors surveyed, particularly between northern and southern Ontario. The following three diagrams illustrate some of the more notable differences.

As Diagram I illustrates, tractors with two trailers make up a greater proportion of trucks in the three northern corridors compared to the southern corridors. Straight trucks are relatively uncommon in the northern corridors.

DIAGRAM I: EQUIPMENT TYPE

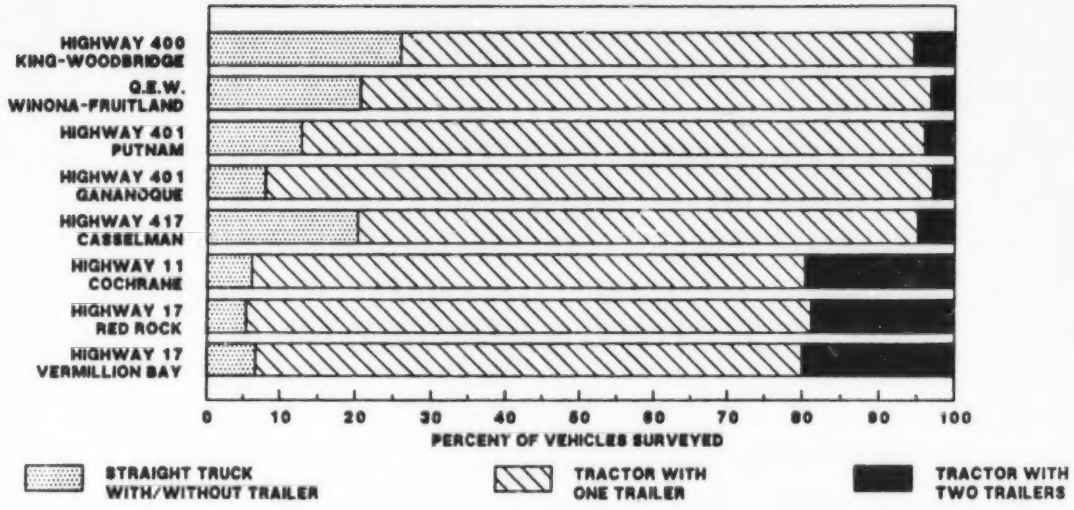


Diagram II presents the breakdown of truck traffic by the number of axles per unit at each of the stations. The three northern corridors experienced a high proportion of trucks with 7 or more axles, reflecting the relatively high occurrence of two trailer units in these corridors.

DIAGRAM II: NUMBER OF AXLES

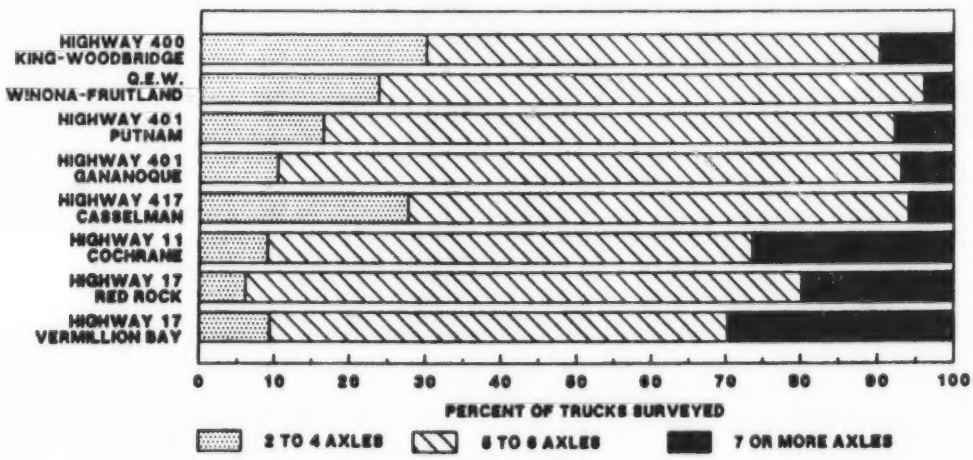
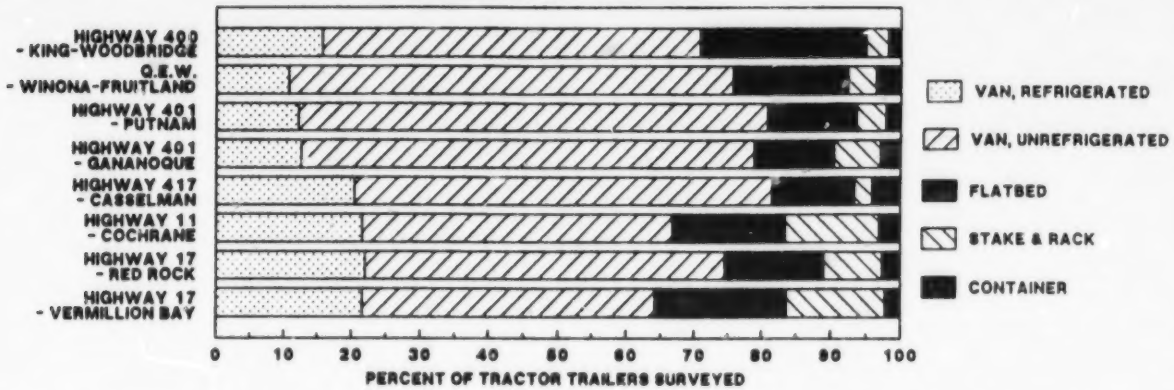


DIAGRAM III: TRAILER STYLE ON TRACTOR TRAILERS

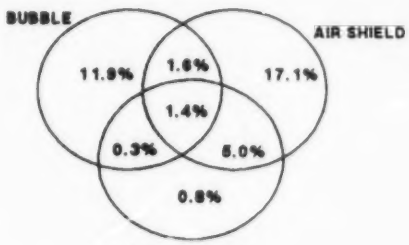


As Diagram III indicates, there are also differences between the corridors in terms of the type of trailer pulled by tractor trailer units. Flatbed and stake & rack trailers make up a relatively high proportion of tractor trailers in the northern corridors, which also experience a proportionately higher occurrence of refrigerated vans.

iv. Energy Saving Devices

During the questionnaire, observations were made on the use of energy saving devices such as bubbles, side farings, and air shields. As Diagram IV indicates, 39.1% of the vehicles surveyed were equipped with at least one energy saving device. 25.1% of trucks had an air shield, 26.2% of the trucks had a bubble, and 7.5% of the trucks surveyed had side farings.

DIAGRAM IV: USE OF ENERGY SAVING DEVICES

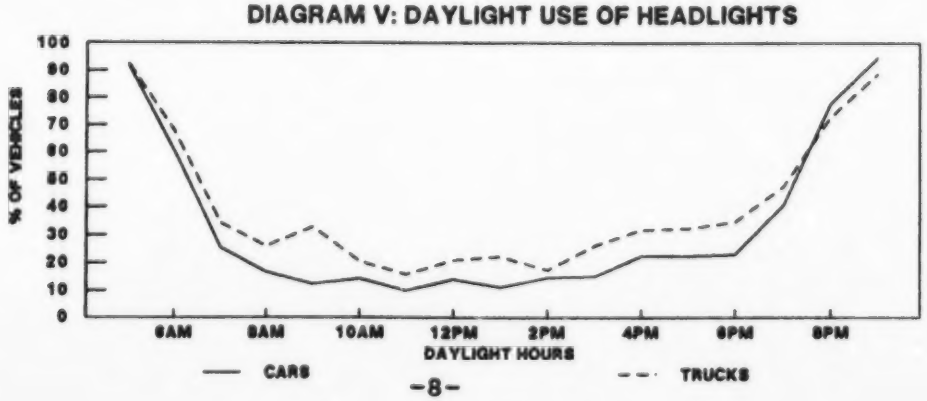


NO ENERGY SAVING DEVICES: 61.8%

v. Headlight Usage

During the classification studies, observations were made on the use of headlights by cars and trucks. Diagram V outlines the average use of headlights during the day by car and truck drivers.

DIAGRAM V: DAYLIGHT USE OF HEADLIGHTS



In the questionnaire, truck drivers were asked how frequently they drove with headlights on during daylight hours. Responses varied significantly according to the time of day in which the interview took place. Of drivers interviewed between 7 AM and 7 PM, 34.8% reported always or often using their headlights during daylight hours. Of drivers interviewed between 7 PM and 7 AM, 48% reported always or often using headlights during daylight hours.

vi. Distances Travelled by Various Equipment Types

Trip distances were derived for drivers interviewed at the Highway 400 stations, the Q.E.W. stations, and the Highway 401 Gananoque stations. The following table gives a breakdown of these trip distances for each equipment type. The data only pertains to vehicles surveyed at these three stations.

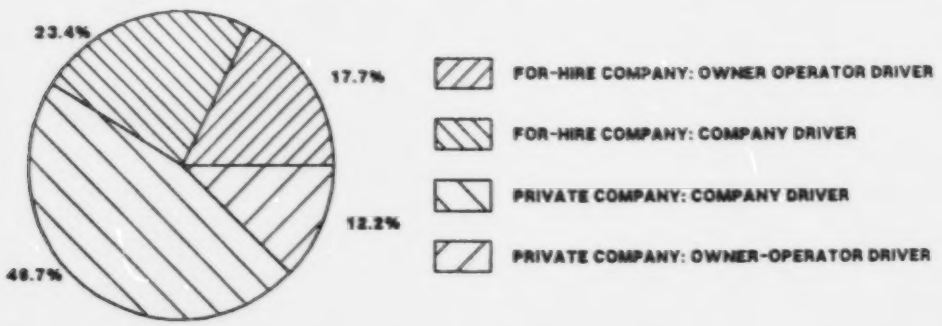
TABLE IX: TRIP DISTANCE DISTRIBUTION BY EQUIPMENT TYPE

DISTANCE	TRACTOR WITH	TRACTOR WITH TWO TRAILERS:			STRAIGHT TRUCK		
(KMS) DIST	ONE TRAILER	A-TRAIN	B-TRAIN	C-TRAIN	NO TRAILER	WITH TRAILER	AVERAGE
0 - 100	14.3%	11.3%	10.9%	8.0%	44.7%	27.8%	19.7%
101 - 250	23.4%	22.5%	10.2%	8.0%	37.8%	16.7%	25.7%
251 - 500	17.0%	18.8%	25.0%	16.0%	9.9%	27.8%	15.9%
501 - 1000	33.3%	27.5%	32.8%	16.0%	6.6%	22.2%	28.3%
OVER 1000	12.0%	20.0%	21.1%	[illegible]%	1.0%	5.6%	10.4%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

vii. Driver and Company Data

In the questionnaire, drivers were asked whether they were owner operators or company drivers, and whether the company was a private or a for-hire carrier. The pie chart in Diagram VI outlines these results. 70.1% of the respondents were company drivers; 58.9% of the drivers were working for private companies.

DIAGRAM VI: DRIVER VERSUS COMPANY TYPE



Using the trip distances derived for drivers interviewed at the Highway 400 stations, the Q.E.W. stations, and the Highway 401 Gananoque stations, a comparison of trip length versus driver type and of trip length versus company type was performed.

The chart in Diagram VII illustrates the influence that trip length has on the use of owner-operators by for-hire and private companies; both types of carriers tend to use owner-operators more for long distance trips.

DIAGRAM VII: TRIP LENGTH AS A FACTOR OF DRIVER TYPE

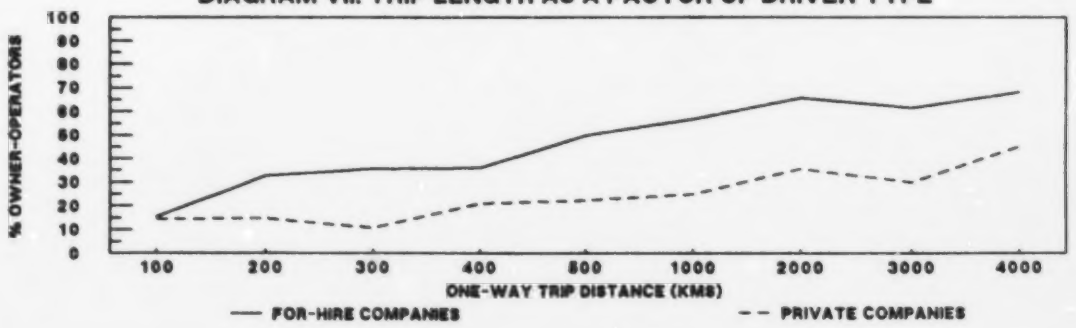
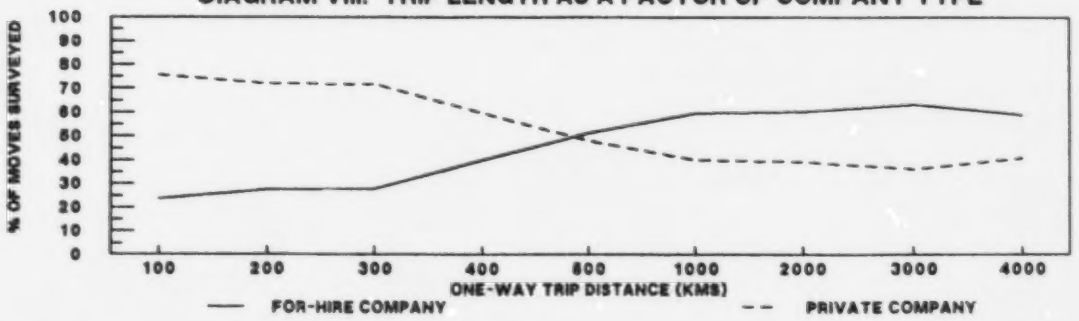


Diagram VIII illustrates the relationship between trip length and company type. The graph indicates that for-hire carriers tend to be travelling longer distances than private carriers.

DIAGRAM VIII: TRIP LENGTH AS A FACTOR OF COMPANY TYPE



viii. Origins and Destinations

The following table outlines the top three endpoints in each direction along the six highway corridors surveyed, based on the origin and destination data obtained in the questionnaire. Toronto figures prominently as an endpoint for trips in all corridors except Highway 417. All corridors except Highway 400 feature at least one prevalent endpoint which is outside the province of Ontario.

TABLE X: TOP THREE TRIP ENDPOINTS

HIGHWAY 400 - 212 AND 213 (KING- WOODBRIDGE)				HIGHWAY 11 - 521 EAST AND WEST (COCHRANE)			
NORTHERN ENDPOINTS		SOUTHERN ENDPOINTS		NORTHERN/WESTERN ENDPOINT		SOUTHERN/EASTERN ENDPOINT	
1. BARRIE	18.0%	1. TORONTO	55.6%	1. ALBERTA	22.0%	1. TORONTO	28.4%
2. SUDBURY	6.8%	2. MISSISSAUGA	6.6%	2. MANITOBA	21.2%	2. QUEBEC	15.5%
3. NEWMARKET	6.4%	3. HAMILTON	3.2%	3. B.C.	11.7%	3. COCHRANE	14.4%
Q.E.W. - 232 AND 235 (WINONA-FRUITLAND)				HIGHWAY 417 - 424 (CASSELMAN)			
SOUTHERN ENDPOINTS		NORTHERN ENDPOINTS		EASTERN/SOUTHERN ENDPOINT		WESTERN/NORTHERN ENDPOINT	
1. NEW YORK	24.8%	1. TORONTO	33.4%	1. QUEBEC	75.7%	1. OTTAWA	63.3%
2. ST. CATHARINES	16.1%	2. HAMILTON	9.9%	2. CORNWALL	5.7%	2. QUEBEC	10.6%
3. NIAGARA FALLS	11.2%	3. MISSISSAUGA	7.4%	3. ALEXANDRIA	2.2%	3. MANITOBA	4.3%
HIGHWAY 401 - 411 AND 412 (GANANOQUE)				HIGHWAY 401 - 311 AND 312 (PUTNAM)			
EASTERN ENDPOINTS		WESTERN ENDPOINTS		EASTERN/SOUTHERN ENDPOINT		WESTERN/NORTHERN ENDPOINT	
1. QUEBEC	68.3%	1. TORONTO	42.4%	1. TORONTO	30.0%	1. LONDON	23.6%
2. OTTAWA	5.7%	2. KINGSTON	11.7%	2. NEW YORK	7.4%	2. MICHIGAN	22.9%
3. BROCKVILLE	4.7%	3. BELLEVILLE	2.7%	3. QUEBEC	6.3%	3. WINDSOR	11.8%
HIGHWAY 17 - 613 EAST AND WEST (RED ROCK)				HIGHWAY 17 - 622 EAST AND WEST (VERMILLION BAY)			
NORTHERN/WESTERN ENDPOINT		SOUTHERN/EASTERN ENDPOINT		NORTHERN/WESTERN ENDPOINT		SOUTHERN/EASTERN ENDPOINT	
1. MANITOBA	32.4%	1. TORONTO	38.5%	1. MANITOBA	43.4%	1. DRYDEN	19.5%
2. THUNDER BAY	21.8%	2. QUEBEC	11.5%	2. ALBERTA	12.5%	2. TORONTO	18.7%
3. ALBERTA	15.2%	3. RED ROCK	9.2%	3. B.C.	11.7%	3. THUNDER BAY	12.0%

ix. Freight

a) Average Tractor Trailer Freight Weight

Through the questionnaire, data was collected on freight weights. Significant differences were found in the average freight weight carried by tractor trailers, both in terms of the location of the survey station and in the type of equipment employed.

As Table XI indicates, the average freight weight increases with the number of axles on the tractor trailer. The three Northern Ontario corridors, (Highway 17 at Red Rock, Highway 17 at Vermillion Bay, and Highway 11 at Cochrane) have a higher average freight weight on 4- and 5-axle vehicles than do the Southern Ontario corridors.

TABLE XI: AVERAGE FREIGHT WEIGHT - BY AXLE
(Kilograms)

	NUMBER OF AXLES				
	4	5	6	7 OR MORE	AVERAGE
NORTHERN ONTARIO CORRIDORS	11,274	14,462	22,923	32,530	19,614
SOUTHERN ONTARIO CORRIDORS	7,120	13,774	23,093	31,530	16,066

In terms of the tractor trailer configuration, B-Train two trailer units have the highest average freight weight, both in Northern and Southern Ontario corridors. There was a low occurrence of C-Train units in the Southern Ontario corridors, making the average freight weight derived for this configuration somewhat suspect.

TABLE XII: AVERAGE FREIGHT WEIGHT - BY CONFIGURATION
(Kilograms)

	CONFIGURATION			
	TRACTOR W. 1 TRAILER	A-TRAIN	B-TRAIN	C-TRAIN
NORTHERN ONTARIO CORRIDORS	17,908	22,096	32,473	27,959
SOUTHERN ONTARIO CORRIDORS	15,554	22,627	30,674	23,807

The figures in Table XIII indicate that stake & rack trailers have the highest average freight weight of the Northern Ontario corridors, while flatbeds have the highest average freight weight in the Southern Ontario Corridors.

TABLE XIII: AVERAGE FREIGHT WEIGHT - BY TRAILER STYLE
(Kilograms)

	TRAILER STYLE			
	VAN	FLATBED	STAKE & RACK	CONTAINER
NORTHERN ONTARIO CORRIDORS	16,391	25,895	28,619	16,256
SOUTHERN ONTARIO CORRIDORS	14,182	23,494	22,743	16,376

b) Freight Distribution by Axles

The freight weight data for tractor trailers was collated against the vehicle size, based on the number of axles. As the data in Table XIV indicates, large vehicles make up a comparatively small proportion of the tractor trailer units surveyed in each of the corridors. However, these large trucks are responsible for moving a high proportion of the freight.

TABLE XIV: FREIGHT DISTRIBUTION BY AXLES

STATION	NUMBER OF AXLES	% OF T/T FREIGHT WEIGHT	% OF LOADED TRACTOR TRAILERS
HIGHWAY 17, W & E (RED ROCK)	4 OR 5	50.3%	63.6%
	OVER 6	49.7%	36.4%
HIGHWAY 17, W & E (VERMILLION BAY)	4 OR 5	40.6%	59.9%
	OVER 6	59.4%	40.1%
HIGHWAY 11, N & S (COCHRANE)	4 OR 5	42.2%	59.2%
	OVER 6	57.8%	40.8%
HIGHWAY 401, E & W (PUTNAM)	4 OR 5	66.7%	80.8%
	OVER 6	33.3%	19.2%
HIGHWAY 417, W (CASSELMAN)	4 OR 5	67.6%	78.5%
	OVER 6	32.4%	21.5%
Q.E.W., S & N (WINONA-FRUITLAND)	4 OR 5	79.7%	88.1%
	OVER 6	20.3%	11.9%
HIGHWAY 401, E & W (GANANOQUE)	4 OR 5	67.3%	79.4%
	OVER 6	32.7%	20.6%
HIGHWAY 400 (KING-WOODBRIDGE)	4 OR 5	53.9%	71.2%
	OVER 6	46.1%	28.8%

c) Freight Types

Freight descriptions were grouped into broad categories. Tables XV and XVI summarize the volume of freight moved in each corridor, broken down by freight type. The volumes and types of freight carried by trucks reflects the predominant industries in each of the corridors. In the northern corridors, **Lumber, Logs and Wood** is the most common specific freight category. At the Q.E.W. and Highway 401 - Putnam stations, the category of **Automotive Supplies** constitutes a significant proportion of freight. Processed and fresh food are common freight types in all corridors.

TABLE XV: FREIGHT TYPES CARRIED IN SOUTHERN ONTARIO CORRIDORS

FREIGHT TYPE	HIGHWAY 401 PUTNAM		HIGHWAY 424 CASSELMAN		QEW, WINONA-FRUITLAND		HIGHWAY 401 GANANOQUE		HIGHWAY 400 KING-WOODBRIDGE	
	% OF MOVES	TONNES* OF FREIGHT	% OF MOVES	TONNES+ OF FREIGHT	% OF MOVES	TONNES* OF FREIGHT	% OF MOVES	TONNES* OF FREIGHT	% OF MOVES	TONNES* OF FREIGHT
APPLIANCES, MACHINERY	3.3%	265	1.8%	44	3.0%	150	2.1%	157	2.6%	112
AUTOMOTIVE SUPPLIES	13.2%	1,163	0.9%	21	9.4%	793	3.7%	333	4.0%	188
BUILDING SUPPLIES	5.7%	759	6.0%	276	7.9%	962	8.2%	1,062	9.4%	829
STEEL & STEEL PRODUCTS	5.9%	1,239	3.8%	222	6.9%	1,089	5.8%	1,185	4.1%	546
OTHER METALS & PRODUCTS	2.3%	333	0.7%	14	1.4%	156	3.5%	521	1.5%	171
PLASTIC & RUBBER PRODUCTS	1.5%	163	0.9%	19	1.4%	107	2.3%	280	1.8%	85
LIVE ANIMALS	0.8%	87	0.4%	9	1.1%	80	0.7%	101	1.9%	102
FOOD, PROCESSED	9.4%	1,233	14.1%	528	8.8%	875	10.8%	1,355	11.2%	860
FOOD, UNPROCESSED	6.9%	1,027	7.7%	195	6.8%	541	4.0%	549	7.2%	414
EMPTY CONTAINERS	5.3%	301	0.9%	16	5.4%	300	3.5%	239	4.0%	184
HOUSEHOLD, OFFICE SUPPLIES	2.7%	201	7.3%	122	4.1%	230	6.8%	482	3.6%	110
MAIL, COURIER	1.3%	70	3.5%	37	1.7%	60	1.4%	131	2.2%	121
USED HOUSEHOLD GOODS	1.1%	41	5.1%	96	1.3%	55	0.6%	55	1.5%	53
LUMBER, LOGS, WOOD	2.0%	382	3.1%	251	4.3%	652	2.4%	278	6.7%	900
PAPER PRODUCTS	4.3%	502	6.2%	227	5.7%	624	7.5%	1,014	4.1%	264
PLANTS, SOD, SEED	0.6%	53	0.7%	31	1.7%	134	0.7%	58	2.3%	233
CHEMICALS, DANGEROUS GOODS	1.5%	222	3.5%	104	1.8%	208	1.7%	201	0.8%	47
SAND, GRAVEL, SALT, STONE	0.4%	59	0.9%	37	0.4%	53	0.4%	62	0.0%	0
MISC. FREIGHT: TRUCKLOAD	21.0%	2,392	15.5%	550	17.1%	1,654	22.3%	2,398	17.1%	1,174
MISC. FREIGHT: LTL	10.8%	858	17.2%	480	9.8%	548	11.5%	1,147	14.0%	894
TOTAL	100%	11,350	100%	3,279	100%	9,271	100%	11,608	100%	7,287

* AVERAGE TONNES OF FREIGHT IN EACH DIRECTION PER 24 HOURS

\+ AVERAGE TONNES OF FREIGHT PER 24 HOURS, BASED ON WESTBOUND LANES ONLY

TABLE XVI: FREIGHT TYPES CARRIED IN NORTHERN ONTARIO CORRIDORS

FREIGHT TYPE	HIGHWAY 17 RED ROCK		HIGHWAY 17 VERMILLION BAY		HIGHWAY 11 COCHRANE	
	% OF MOVES	TONNES* OF FREIGHT	% OF MOVES	TONNES* OF FREIGHT	% OF MOVES	TONNES* OF FREIGHT
APPLIANCES, MACHINERY	1.6%	32	1.2%	31	1.2%	16
AUTOMOTIVE SUPPLIES	0.5%	11	1.2%	18	0.0%	0
BUILDING SUPPLIES	2.1%	67	3.6%	105	5.5%	152
STEEL & STEEL PRODUCTS	1.9%	91	1.5%	77	1.2%	45
OTHER METALS & PRODUCTS	0.9%	34	0.3%	14	0.4%	21
PLASTIC & RUBBER PRODUCTS	0.3%	5	0.0%	0	0.0%	0
LIVE ANIMALS	1.6%	64	2.1%	65	4.7%	136
FOOD, PROCESSED	7.6%	250	9.9%	256	14.6%	325
FOOD, UNPROCESSED	2.7%	89	3.0%	88	4.3%	111
EMPTY CONTAINERS	1.6%	26	1.5%	28	0.8%	10
HOUSEHOLD, OFFICE SUPPLIES	1.9%	49	3.6%	54	3.5%	48
MAIL, COURIER	3.6%	78	4.2%	46	2.4%	24
USED HOUSEHOLD GOODS	5.7%	103	13.5%	219	13.8%	171
LUMBER, LOGS, WOOD	15.7%	814	20.7%	1,156	18.1%	744
PAPER PRODUCTS	4.3%	199	1.5%	48	1.2%	29
PLANTS, SOD, SEED	0.8%	15	0.3%	14	0.0%	0
CHEMICALS, DANGEROUS GOODS	2.1%	83	1.2%	49	1.2%	17
SAND, GRAVEL, SALT, STONE	0.5%	37	2.1%	105	0.4%	20
MISC. FREIGHT: TRUCKLOAD	20.9%	613	9.9%	280	15.4%	356
MISC. FREIGHT: LTL	23.6%	717	18.6%	485	11.4%	255
TOTAL	100%	3,377	100%	3,138	100%	2,480

* AVERAGE TONNES OF FREIGHT IN EACH DIRECTION PER 24 HOURS

D. SUMMARY AND OBSERVATIONS

The 1987 Truck Survey provided a "snap-shot" view of truck transportation in various corridors across the province, allowing general observations on vehicle types and trip patterns in the surveyed highways.

The most heavily utilized lanes by vehicles of all types were at the Q.E.W. and Highway 400 inspection stations, which averaged in excess of 1,000 vehicles per hour in each direction. The Q.E.W. also experienced a high level of truck traffic, as did Highway 401 at the Putnam stations near London; these lanes averaged over 150 trucks per hour in each direction.

The most common type of truck observed at all stations was a five-axle tractor trailer with a van. However, there are significant differences in equipment types between northern and southern Ontario corridors. A higher percentage of trucks in the three northern corridors are two-trailer units, having seven or more axles. The southern corridors, particularly those with several large towns and cities, experience a higher percentage of straight trucks.

Of the trucks involved in the interview portion of the survey, 39.1% were equipped with energy-saving devices. The most common type was the air shield. Side farings were least common, and tended to be used in conjunction with a bubble and/or an air shield.

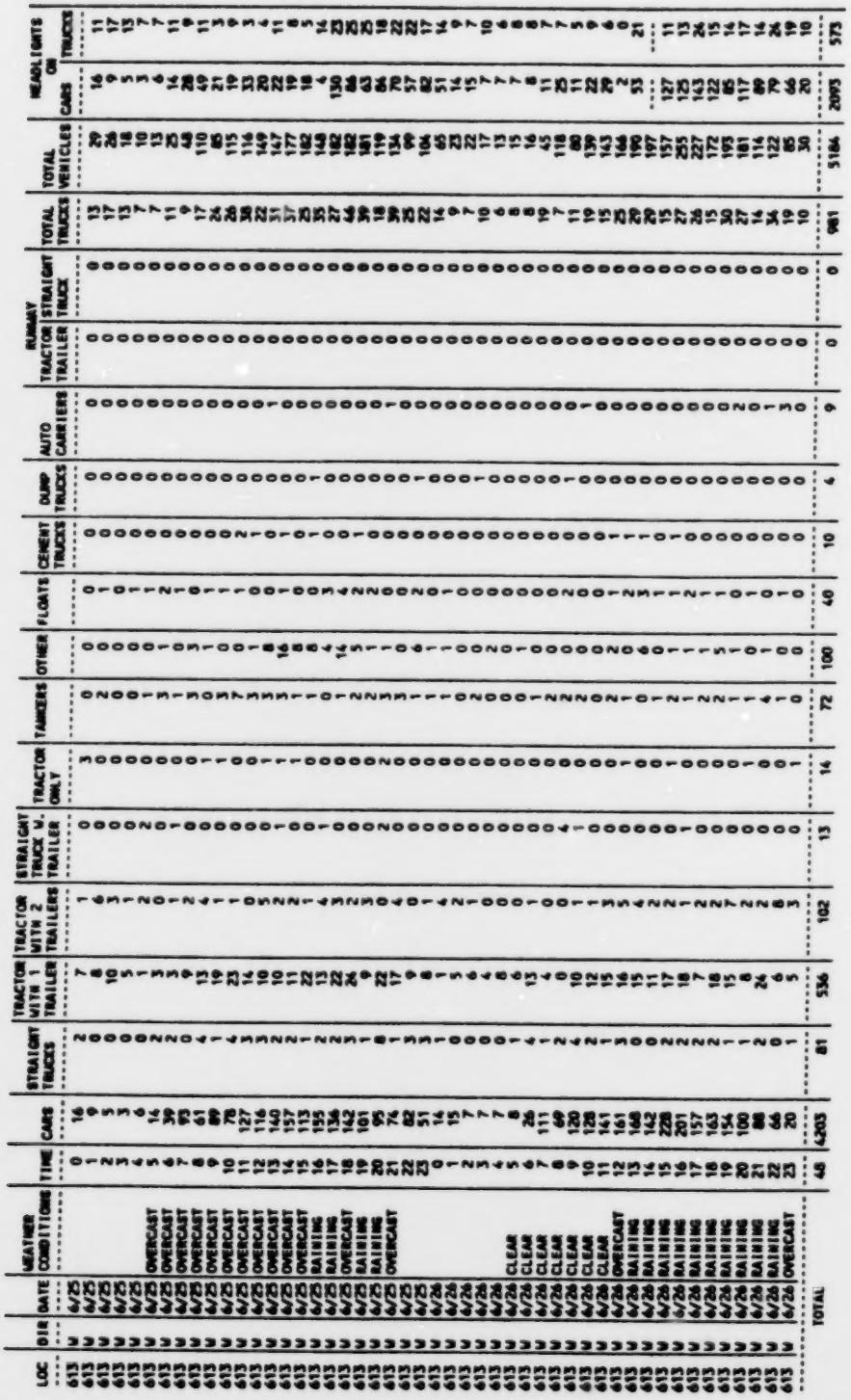
At least 10% of cars and 16% of trucks used their headlights during daylight hours. Use of headlights was influenced by the time of day, weather conditions, and traffic levels.

Of truck drivers interviewed, 70.1% were company drivers. 58.9% of the drivers were working for a private company. However, the occurrence of owner-operators and for-hire companies increased with longer hauls.

Toronto was among the top three origin/destination points in all corridors except Highway 417. With the exception of Highway 400, at least 23% of all movements interviewed were extraprovincial in nature.

Generally, vehicles surveyed in the northern corridors had a higher average freight weight than those in the southern corridors. The volumes and types of freights carried in each of the corridors reflected the predominant industries in each corridor.

APPENDIX 1: EXAMPLE OF CLASSIFICATION SURVEY FORM



LOC	DIR	DATE	WEATHER CONDITIONS	TIME	CARS	STRAIGHT TRUCKS	TRACTOR WITH 1 TRAILER	TRACTOR WITH 2 TRAILERS	STRAIGHT TRUCK W. TRAILER	TRACTOR ONLY	TANKERS	OTHER	FLOATS	CEMENT TRUCKS	DUMP TRUCKS	AUTO CARRIERS	RUNWAY TRACTOR TRAILER	RUNWAY STRAIGHT TRUCK	TOTAL TRUCKS	TOTAL VEHICLES	HEADLIGHTS ON CARS	HEADLIGHTS ON TRUCKS
613	3	6/25		0	16	2	7	1	0	0	0	0	0	0	0	0	0	0	10	26	16	10
613	3	6/25		1	5	0	8	0	0	0	0	0	0	0	0	0	0	0	8	13	5	8
613	3	6/25		2	7	0	5	0	0	0	1	0	0	0	0	0	0	0	6	13	7	6
613	3	6/25		3	5	0	1	0	0	0	0	0	0	0	0	0	0	0	1	6	5	1
613	3	6/25		4	14	0	4	0	0	0	0	0	0	0	0	0	0	0	4	18	14	4
613	3	6/25		5	9	0	3	0	0	0	0	0	0	0	0	0	0	0	3	12	9	3
613	3	6/25		6	9	0	4	0	0	0	0	0	0	0	0	0	0	0	4	13	9	4
613	3	6/25		7	14	0	6	0	0	0	0	0	0	0	0	0	0	0	6	20	14	6
613	3	6/25		8	16	0	6	0	0	0	0	0	0	0	0	0	0	0	6	22	16	6
613	3	6/25		9	10	0	4	0	0	0	0	0	0	0	0	0	0	0	4	14	10	4
613	3	6/25		10	11	0	4	0	0	0	0	0	0	0	0	0	0	0	4	15	11	4
613	3	6/25		11	11	0	4	0	0	0	0	0	0	0	0	0	0	0	4	15	11	4
613	3	6/25		12	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		13	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		14	11	0	4	0	0	0	0	0	0	0	0	0	0	0	4	15	11	4
613	3	6/25		15	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		16	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		17	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		18	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		19	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		20	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		21	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		22	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/25		23	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		0	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		1	11	0	4	0	0	0	0	0	0	0	0	0	0	0	4	15	11	4
613	3	6/26		2	11	0	4	0	0	0	0	0	0	0	0	0	0	0	4	15	11	4
613	3	6/26		3	11	0	4	0	0	0	0	0	0	0	0	0	0	0	4	15	11	4
613	3	6/26		4	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		5	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		6	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		7	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		8	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		9	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		10	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		11	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		12	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		13	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		14	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		15	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		16	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		17	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		18	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		19	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		20	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		21	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		22	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26		23	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	0	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	1	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	2	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	3	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	4	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	5	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	6	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	7	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	8	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	9	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	10	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	11	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	12	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	13	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	14	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	15	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	16	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	17	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	18	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	19	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	20	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	21	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	22	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
613	3	6/26	OVERCAST	23	14	0	5	0	0	0	0	0	0	0	0	0	0	0	5	19	14	5
TOTAL				48	4203	81	536	102	13	14	72	100	40	10	4	9	0	0	981	5184	2093	573

APPENDIX 2: EXAMPLE OF INTERVIEW SURVEY FORM

1987 TRUCK DATA SURVEY QUESTIONNAIRE

1. OBSERVATIONS: (Specialized equipment, such as tankers, floats, cement mixers and gravel trucks are to be excluded from interviews)

Control # ☐☐☐☐☐ Interviewer ☐☐☐ Location ☐☐☐ Time ☐☐☐☐ MMDD ☐☐☐☐

a) Direction of travel: 1) North 2) East 3) South 4) West ☐

b) Weight from weigh scale slip ☐☐☐☐☐☐

c) Configuration: 1) Tractor-semi 2) A-Train
3) B-Train 4) C-Train
5) Straight Truck 6) Truck & Trailer ☐

d) Trailer Style 0) Straight Truck 1) Van 2) Flatbed
3) Stake & Rack 4) Container ☐

e) Number of axles ☐☐

f) Tractor Style: 1) Conventional 2) Cabover ☐

g) Drome Box: 1) Yes 2) No ☐

h) Reefer: 1) Yes 2) No ☐

i) Air shield on tractor: 1) Yes 2) No ☐

j) Side Fairings: 1) Yes 2) No ☐

k) Bubble on Trailer: 1) Yes 2) No ☐

l) Bead Lights on: 1) Yes 2) No ☐

2. QUESTIONS:

a) How often do you drive a vehicle such as this one with your headlamps on during daylight hours?
1) Always 2) Often 3) Occasionally 4) Never ☐

b) Are you an owner operator? 1) Yes 2) No ☐

c) Is your company: 1) for hire or 2) private ☐

d) In terms of space occupied, how full is your trailer?
0) empty 1) 1/4 full 2) 1/2 full
3) 3/4 full 4) full 5) don't know ☐
(enter 0 in questions e, f, g and h if trailer is empty)

In order to answer the last questions we may have to look at your freight documentation

e) How much does your freight weigh? ☒ if lbs. ☐ ☐☐☐☐☐

f) How many shipments are you carrying? ☐☐☐

g) How many shipments are you carrying over 10,000 lbs? ☐

h) How would you describe your freight?
1) General freight (truckload) 2) General freight (less-than-truckload) 3) Used Household Goods 4) Live Animals
5) Parcel Carriers/Couriers 6) Logs or Lumber
7) If other specify ..... ☐

i) What is the initial origin and final destination of the freight?

	Nearest City	Province/State
Shipper/ Origin		
Consignee/ Destination		

☐☐☐☐☐☐☐
☐☐☐☐☐☐☐

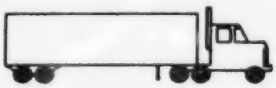
If less-than-truckload or empty: Initial origin and final destination of trailer.

APPENDIX 3: DIAGRAMS OF VEHICLE TYPES INVOLVED IN INTERVIEWS

TRUCK CONFIGURATION

1. STRAIGHT TRUCK

2. TRACTOR TRAILER

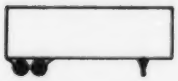


3. A-TRAIN AND C-TRAIN

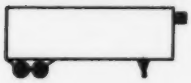
4. B-TRAIN

TRAILER STYLE

1. VAN, UNREFRIGERATED



2. VAN, REFRIGERATED



3. FLATBED

4. STAKE & RACK

6. CONTAINER

TRACTOR STYLE

1. CONVENTIONAL

2. CABOVER